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10/716,373	11/18/2003	Enrico Alessi	64659-00002USPX	4364

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EXAMINER	
AKHAVANNIK, HADI	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/716,373	ALESSI ET AL.	
	Examiner	Art Unit	
	HADI AKHAVANNIK	2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *27 February 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-28* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-11,13-23 and 25-28* is/are rejected.

7)☒ Claim(s) *12, 24* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

Response to Arguments

Applicants arguments with respect to the Election requirement are persuasive. Therefore the restriction requirement is withdrawn.

Applicant's arguments filed 10/22/07 have been fully considered but they are not persuasive.

First Applicant argues that Siddiqui's method works with only two marker images but the current invention works with only marker image. The Examiner agrees that Siddiqui uses two marker images, however the claims do not prohibit the use of two marker images. The claims only require that each spot is segmented and Siddiqui accomplishes this task and his method reads on the independent claims. So, although the claims focus on only a single marker image, they do not prohibit the use of two marker images to accomplish the same goal.

Next Applicant argues that Gardes does not teach the limitations in claims 6-10, 17-21, 23, and 25-28. The Examiner has addressed these limitations more specifically in the final rejection below.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

1. Claim 1-4, 13-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Siddiqui et al. (article titled "Mathematical Morphology applied to Spot Segmentation and Quantification of Gene Microarray Images, referred to as "Siddiqui" herein) in view of Bozinov et al. (article titled "Unsupervised technique for robust target separation and analysis of DNA microarray sports through adaptive pixel clustering", referred to as "Bozinov' herein) in further view of Gardes et al. (6901168, referred to as "Gardes" herein).

Regarding claim 1, Siddiqui discloses a method of analysis of an array image including one or more luminous spots on a background, comprising: determining a shape and location of each spot on the array image (see the abstract, page 926 section titled introduction, and page 928 section titled spot segmentation of gene microarray image. These sections disclose analyzing finding the location of spots in DNA images);

generating a binary map of pixels defining a boundary of each spot on the background (section III on page 928 disclose binarization of the image);

isolating each spot from the background by an extraction operation using said binary map (section III disclose segmenting the spots);

and for each spot, defining relative characteristic parameters and quality indexes (section IV discloses quantification evaluation of the data);

wherein said binary map is generated with a technique of morphological filtering comprising: filtering the array image with at least a morphological filter generating a corresponding marker image of the background (section II discloses morphological filters for the binary image);

determining background level by carrying out a reconstruction operation on said marker image to generate a corresponding reconstructed image of the background; and generating a filtered image of the luminosity of the background by performing a top-hat operation on said reconstructed background image and the array image; and performing a thresholding operation on said filtered image of the background luminosity (the last paragraph of section III discloses using a filter to remove noise. Section II discloses using a top hat operator to remove peaks).

Siddiqui does not explicitly disclose using clustering.

Bozinov discloses examining each spot by a segmentation operation to identify pixels belonging to a same cluster according to a preestablished criterion (pages 749-750 give an overview of the dna spot clustering method, which uses preestablished criterion);

It would have been obvious at the time of the invention to one of ordinary skill in the art to include in Siddiqui a clustering method as taught by Bozinov. The reason for the combination is because it makes for a more robust system that is able to group an array of dna spots based on their similarities. Further, both inventions are from the same field of endeavor of spot analysis.

Siddiqui and Bozinov do not explicitly disclose using grey level information.

Gardes discloses using grey level information in columns 7-8.

It would have been obvious at the time of the invention to one of ordinary skill in the art to include in Siddiqui and Bozinov a grey level calculating and relationship

finding means as taught by Gardes. The reason for the combination is because it allows the system to more accurately classify the items within each cluster.

Regarding claim 2, Siddiqui discloses that the reconstruction operation is carried out using circular masks (see pages 927-928 and page 929, section B as it discloses circularity).

Regarding claim 3, Siddiqui discloses filtering of the noise corrupting said binary map by: carrying out in succession two erosion operations using circular masks of different radios; carrying out a dilation operation using a circular mask of diameter larger than the maximum dimensions of the spot, generating a binary map filtered from noise; and using said binary map filtered from noise in said extraction operation (pages 927-928 disclose using morphological segmentation techniques to remove noise and segment the dna spots).

Regarding claim 4, Siddiqui and Bozinov disclose defining on a Cartesian reference frame spots present in the array image; carrying out in succession the following morphological filtering operations of said spots with directional openings having as structuring said segments of length not larger than the maximum dimension of the spots and oriented, respectively, along: the bisecting line of the first and third quadrant; the bisecting line of the second and fourth quadrant; the abscissa axis; and the ordinate axis; of said Cartesian reference frame (section II discloses using directions opening and closing morphological operators. Figure 4 of Bosinov discloses using filters within a defined grid size)

Regarding claim 13, the rejection of claims 1-3 disclose all aspects of claim 13.

Regarding claim 14, Bosinov discloses having a spot extraction system for isolating luminous spots on a background of an array image, comprising: a scanning subsystem (Extractor) of the pixels of an image; a subsystem (Features Extractions, Clustering Conditions) of identification of elementary clusters composed of adjacent pixels scanned in succession implementing the spot extraction operation; and a subsystem (Clustering) of processing of said elementary clusters outputting clusters of pixels (Cluster 1, . . . , Cluster N) present in the spot (pages 749-751 disclose these basic clustering steps).

Regarding claim 15, Bozinov discloses thresholds and preestablsihed criteria that is used for clustering the data.

Regarding claim 16, pages 749-750 of Bozinov discloses using multiple clustering classes.

Regarding claim 6, Gardes discloses wherein said preestablished criterion of segmentation comprises calculating a characteristic value for pixels of a spot by a fuzzy logic algorithm comprising: calculating for said spot the mean value of grey level of the background pixels, said fuzzy logic algorithm using as antecedents: the grey level of a pixel; the distance between said grey level of the pixels and the mean grey level of the background pixels; and the square of said distance; and recognizing said pixels as belonging to a same cluster if said characteristic value exceeds a preestablished threshold (see column 8 lines 1-65 as it discloses finding the difference between the grey levels for each cluster in order to establish proper inter-class variance thresholds. Column 7 lines 21-64 further define creating a grey level image and the equations in

column 8 disclose mean grey level for the image, the variance which includes the distance and square of the distance. The intra-class variance finds the difference between the grey level and the mean grey level. The system is used to find the classification for each cluster of pixels as disclosed in column 9 lines 3-45 which discloses finding the optimal parameters for each cluster).

Regarding claim 7, Gardes discloses defining by said preset criterion for each spot a first zone containing signal pixels and a second zone containing background and/or noise pixels (Gardes does this by establishing a true signal with the least amount of variance and the false signal with greatest amount of variance as taught in column 8 lines 46-65 discloses finding the variance).

Regarding claim 8 and 10, column 8 lines 51-65 of Gardes discloses clustering in multiple groups so as to minimize interclass variance. Also see column 9 lines 3-45 as discussed in the rejection of claim 6.

Regarding claim 9, column 8 lines 7-51 discloses mean and variances for each group.

Regarding claim 17-21, please see the rejection of claim 6-9 as it discloses all aspects of claims 17-21.

Regarding claim 23, please see the rejection of claim 7 as it discloses all aspcts of claim 23.

Regarding claim 25, the rejection of claims 1-3 and 6 disclose all aspects of claim 25.

Regarding claim 26, the rejection of claim 6 discloses all aspects of claim 26.

Regarding claims 27-28, the rejection of claims 1 and 6 discloses that both Gardes and Bozinov disclose a fuzzy logic clustering system.

2. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Siddiqui et al. (article titled "Mathematical Morphology applied to Spot Segmentation and Quantification of Gene Microarray Images, referred to as "Siddiqui" herein) in view of Bozinov et al. (article titled "Unsupervised technique for robust target separation and analysis of DNA microarray sports through adaptive pixel clustering", referred to as "Bozinov' herein) in view of Gardes and in further view of Alessi et al. (article titled "A New Clustering Based System For Automated Object Recogntion", referred to as "Alessi" herein).

Regarding claim 5, the rejection of claim 1 discloses all aspects of claim 5 except for the specific clustering steps.

Alessi discloses these clustering steps in figure 2 and section titled "General System Description".

It would have been obvious at the time of the invention to one of ordinary skill in the art to combine in Siddiqui, Bozinov, and Gardes the specifics of the clustering as taught by Alessi. The reason for the combination is because this is a standard clustering sequence that many grouping algorithms use.

3. Claims 11, 22, are rejected under 35 U.S.C. 103(a) as being unpatentable over Siddiqui et al. (article titled "Mathematical Morphology applied to Spot Segmentation and Quantification of Gene Microarray Images, referred to as "Siddiqui" herein) in view of Bozinov et al. (article titled "Unsupervised technique for robust target separation and analysis of DNA microarray sports through adaptive pixel clustering", referred to as "Bozinov' herein) in view of Gardes et al. (6901168, referred to as "Gardes" herein) and in further view of Alessi et al. (article titled "A New Clustering Based System For Automated Object Recogntion", referred to as "Alessi" herein).

Regarding claim 11, the rejection of claim 6 discloses all aspects of claim 11 except for the specific clustering steps.

Alessi discloses these clustering steps in figure 2 and section titled "General System Description".

It would have been obvious at the time of the invention to one of ordinary skill in the art to combine in Siddiqui, Bozinov, and Gardes the specifics of the clustering as taught by Alessi. The reason for the combination is because this is a standard clustering sequence that many grouping algorithms use.

Regarding claim 22, the rejection of claim 11 above discloses all aspects of claim 22.

Allowable Subject Matter

4. Claims 12 and 24 objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to HADI AKHAVANNIK whose telephone number is (571)272-8622. The examiner can normally be reached on 10:30-7:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bhavesh M. Mehta can be reached on 571-272-7453. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Bhavesh M Mehta/
Supervisory Patent Examiner, Art Unit 2624

HA
5/10/08